BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Engineering Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Electrical and Electronic Engineering Pearson BTEC International Level 3 Diploma in Mechanical Engineering Pearson BTEC International Level 3 Diploma in Digital Engineering Pearson BTEC International Level 3 Diploma in Manufacturing Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical and Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Mechanical Engineering Pearson BTEC International Level 3 Extended Diploma in Digital Engineering Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering
Unit number and title	**Unit 25: Mechanical Behaviour of Metallic Materials**
Learning aim(s)	**A:** Investigate the microstructures of metallic materials, the effects of processing on them and how these effects influence their mechanical properties
Assignment title	Ferrous, non-ferrous metals and alloys; their microstructures and mechanical properties
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are working as an apprentice technician for a large company that manufactures hydraulic systems and airframe components for the aerospace industry. Your training supervisor has reviewed your progress and is impressed by your general understanding of the metallic materials used in the manufacture of the company's products. They have now asked you to investigate the microstructure of ferrous and non-ferrous metals and the effects of processes, such as heat treatment and mechanical forming, on the mechanical properties of these materials.
Task 1	You are going to investigate the micro-structures of a range of metal samples and identify the material and processing history by comparing what you see with reference sources. **To do this:** Your tutor will provide you with a selection of ferrous and non-ferrous specimens that have been prepared for micro-examination and are of known origin (composition and processing history). **You need to:** • Examine the surface of each specimen and make visual records of what you see. These could be hand sketches or digital images that are annotated to identify features

	of the grain structures such as grain boundaries, impurities, phases (for example, pearlite, ferrite in steel); and • Compare the surface image against a data source and identify the material and processing history (for example, cold rolled mild steel will have elongated [distorted] ferrite crystals; cold rolled mild steel followed by annealing will have equi-axed ferrite crystals). **You then need to:** Produce an organised technical report that presents the findings of your micro-examinations and considers the effects of processing history and material composition on the mechanical properties of your tested materials, for example increased hardness caused by cold working or heat treatment. Your report should include: • Annotated images of the examined samples • Evidence of identification against the reference source with comparative commentary • An annotated phase diagram for each specimen • Information about the effect that impurities and grain boundaries have on the mechanical properties of materials
Checklist of evidence required	A written report containing annotated images, extracts from an accredited materials data source, materials identification evidence, phase diagrams and a learner observation record

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
25/A.D1	Evaluate, using an accredited data source, the microstructures of non-processed and processed metallic materials to correctly identify the material, including how the processing history, impurities and grain boundaries affect the mechanical properties of the materials.
25/A.M1	Analyse, using an accredited data source, the microstructures of non-processed and processed metallic materials to correctly identify the material, including how the processing history affects the mechanical properties of the materials.
25/A.P1	Explain how the microstructures of non-processed metallic materials affects the mechanical properties of the materials.
25/A.P2	Explain how the microstructures of processed metallic materials affects the mechanical properties of the materials.

Sources of information to support you with this Assignment	Books Materials for Engineers and Technicians 6th Edition; Bolton W, Higgins R A; Routledge, 2014; ISBN 978-1138778757 Websites doitpoms.ac.uk - includes micrographs of a large range of materials matweb.com makeitfrom.com
Other assessment materials attached to this Assignment Brief	Reference images Prepared specimens/surface images **Note to assessor** [please delete this section on issue to learners and adjust the assignment accordingly if applied] For a centre that does not have access to microscopy equipment or suitably prepared metal samples it is acceptable to give learners images of the metal surfaces. The unlabelled images will show, at an appropriate magnification, the metal surface to be evaluated by the learner.